

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

29 February 2000 (29.02.00)

International application No.

PCT/NZ99/00047

Applicant's or agent's file reference

15868/4x037

International filing date (day/month/year)

21 April 1999 (21.04.99)

Priority date (day/month/year)

21 April 1998 (21.04.98)

Applicant

INNES, Rodney, Mitchell

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

17 November 1999 (17.11.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Olivia RANAIVOJAONA

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

To:
WILSON, ALLEN, WELLS. SIMS, LEWIS
& GRAVIT
29 Clarence Street
P.O. Box 759
Hamilton 2001
NEW ZEALAND

Date of mailing
(day/month/year) **19/10/1999**

Applicant's or agent's file reference
15868/4x037

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/NZ 99/ 00047

International filing date
(day/month/year) **21/04/1999**

Applicant
ORGANIC INTERCEPTOR PRODUCTS LIMITED et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority:

 European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Jaap Hurenkamp

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/PEA/401).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ 99/00047

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A01N 65/00, A01N 31/04, A01N 31/06, A01N 31/02, A01N 27/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 9831223 A1 (ACTION PIN), 23 July 1998 (23.07.98)	1-46
X	WO 9105472 A1 (SAFER, INC.), 2 May 1991 (02.05.91), page 1, line 25 - page 2, line 5; page 3, line 29 - line 31; page 4, line 2 - line 3; page 9, line 20 - line 26	1-46
X	AU 7421096 A (ERROLL M PULLEN ET AL), 26 June 1997 (26.06.97), claims 6-8; page 7, line 11 - line 12	1-46

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

20 Sept 1999

Name and mailing address of the International Searching Authority
European Patent Office P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel: (+31-70)340-2040. Tx 31 651 epo nl.
Fax: (+31-70)340-3018

Date of mailing of the international search report

Authorized officer

Gerd Strandell/EØ

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ 99/00047

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9616549 A1 (ACTION PIN), 6 June 1996 (06.06.96), page 1, line 6 - line 15; page 3, line 13 - line 15; page 14, line 10; page 16, line 17 - line 18 --	1-46
X	CA 1153267 A (AMERICAN CYANAMID COMPANY), 6 Sept 1983 (06.09.83) --	1-33,44
X	GB 1464716 A (JEYES U.K. LIMITED), 16 February 1977 (16.02.77) --	1-22,33,44
X	BE 1002598 A6 (BIOLISSA S.C.), 9 April 1991 (09.04.91) --	1-22,33,44
A	WO 9716975 A1 (SELGA, JOHN ET AL), 15 May 1997 (15.05.97) --	1-46
A	EP 0617888 A1 (W. NEUDORFF GMBH KG), 5 October 1994 (05.10.94) ----- -----	1-46

INTERNATIONAL SEARCH REPORT
Information on patent family members

30/08/99

International application No.

PCT/NZ 99/00047

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9831223 A1	23/07/98	AU 2513397 A	29/10/97
		AU 5993698 A	07/08/98
		EP 0891236 A	20/01/99
		FR 2758436 A	24/07/98
WO 9105472 A1	02/05/91	AT 141130 T	15/08/96
		CA 2069311 A	14/04/91
		DE 69028114 D,T	03/04/97
		EP 0495876 A,B	29/07/92
		GR 3021670 T	28/02/97
		JP 5501254 T	11/03/93
		US 5035741 A	30/07/91
		US 5098468 A	24/03/92
AU 7421096 A	26/06/97	US 5753593 A	19/05/98
WO 9616549 A1	06/06/96	AU 4265296 A	19/06/96
		CA 2181941 A	06/06/96
		EP 0741519 A	13/11/96
		FR 2727290 A,B	31/05/96
CA 1153267 A	06/09/83	NONE	
GB 1464716 A	16/02/77	NONE	
BE 1002598 A6	09/04/91	NONE	
WO 9716975 A1	15/05/97	AU 1795995 A	16/11/95
		AU 3768095 A	29/05/97
		AU PM552994 D	00/00/00
		AU 699468 B	03/12/98
EP 0617888 A1	05/10/94	AT 171341 T	15/10/98
		CA 2114910 A	19/08/94
		DE 69413440 D,T	29/04/99
		US 5631290 A	20/05/97

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

JAMES & WELLS
Private Bag 3140
HAMILTON
New Zealand

PCT NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
day/month/year

22 MAR 2000

Applicant's or agent's file reference

15868/4LW

IMPORTANT NOTIFICATION

International application No.

PCT/NZ99/00047

International filing date

21 April 1999

Priority date

21 April 1998

Applicant

ORGANIC INTERCEPTOR PRODUCTS LIMITED

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide

Name and mailing address of the IPEA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

GAYE HOROBIN

Telephone N . (02) 6283 2069

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 15868/4LW	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. PCT/NZ99/00047	International filing date (<i>day/month/year</i>) 21 April 1999	Priority Date (<i>day/month/year</i>) 21 April 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ A01N 65/00, 31/06, 31/04, 31/02, 27/00		
Applicant ORGANIC INTERCEPTOR PRODUCTS LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheet(s).

3. This report contains indications relating to the following items:

- | | | |
|------|-------------------------------------|---|
| I | <input checked="" type="checkbox"/> | Basis of the report |
| II | <input type="checkbox"/> | Priority |
| III | <input type="checkbox"/> | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | <input type="checkbox"/> | Lack of unity of invention |
| V | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | <input type="checkbox"/> | Certain documents cited |
| VII | <input type="checkbox"/> | Certain defects in the international application |
| VIII | <input type="checkbox"/> | Certain observations on the international application |

Date of submission of the demand 19 November 1999	Date of completion of the report 3 March 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile N (02) 6285 3929	Authorized Officer GAYE HOROBIN Telephone No. (02) 6283 2069

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages 1-23, as originally filed,
pages , filed with the demand,
pages , filed with the letter of .
- ☒ the claims, pages , as originally filed,
pages 24-29, as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages , filed with the letter of .
- ☐ the drawings, pages , as originally filed,
pages , filed with the demand,
pages , filed with the letter of .
- ☐ the sequence listing part of the description:
pages ; as originally filed
pages ; filed with the demand
pages , filed with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Statement

Novelty (N)	Claims 1-46	YES
	Claims	NO
Inventive step (IS)	Claims 1-46	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-46	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)**NOVELTY(N), INVENTIVE STEP(IS)**

No citation or obvious combination of citations discloses the features of the claimed invention. None of the citations discloses the use of a pine oil in combination with a fatty acid soap as an agricultural composition. CA 1 153 267 and GB 1 464 716 both disclose cleaning compositions containing a pine oil or derivative and a fatty acid soap but they are wholly silent on whether the composition produces a foam during use.

THE CLAIMS DEFINING THE INVENTION ARE:

1. An agricultural composition including a combination of:
 - a) a monoterpene alcohol portion including a pine oil with an alcohol content of at least 60% by weight,
 - b) a fatty acid soap from the combination of either or both of tall oil, or fatty acid compound, with an alkali metal compound,
 - c) optionally including a foam enhancing agent as defined herein, and
 - d) optionally including one or more carriers or diluents;
 the proportion of (b) fatty acid soap and (c) foam enhancing agent, in the composition, being sufficient to allow the composition to be applied as, or to produce, a foam having at least a surface monolayer of bubbles during use.
2. An agricultural composition as claimed in claim 1 in which the monoterpene alcohol portion includes pine oil having an alcohol content of at least 80%.
3. An agricultural composition as claimed in claim 2 in which substantially all of the monoterpene alcohol portion comprises pine oil.
4. An agricultural composition as claimed in any one of the preceding claims in which the fatty acid soap is derived substantially entirely from tall oil, and in which the ratio of tall oil to pine oil used in preparing the composition is within the range of 10:80 to 25:60 by weight.
5. An agricultural composition as claimed in any one of the preceding claims in which, excluding optional carriers and diluents, there is present at least 30% by weight of monoterpene alcohols as defined herein.
6. An agricultural composition as claimed in any one of the preceding claims in which there is present, excluding optional components, at least 55% by weight of pine oil.
7. An agricultural composition as claimed in any one of the preceding claims, in which in addition to the pine oil the monoterpene alcohol

portion includes either or both of additional monoterpene alcohols, or plant derived oils containing same.

8. An agricultural composition as claimed in claim 7 in which the additional monoterpene alcohols, or plant derived oils containing same, include: pinenes, terpineols, borneols, isoborneols, eucalyptus oil, citronellol, liminol, and oils from members of the citrus family.
9. An agricultural composition as claimed in any one of the preceding claims; which also includes at least one member from a group comprising: mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
10. An agricultural composition as claimed in claim 9 in which members of the listed group include: anethols, fenchols, members of the limonene family, members of the camphene family, members of the thujol family, dipentes, members of the eugenol family, members of the phellandrene family, and cavarcols.
11. An agricultural composition as claimed in any one of the preceding claims, in which, excluding optional components, a maximum of 35% by weight of tall oil and fatty acid soaps are present.
12. An agricultural composition as claimed in claim 11 in which, excluding optional carriers or diluents, between 12 and 25% inclusive by weight of tall oil and fatty acid soaps derived therefrom are present.
13. An agricultural composition as claimed in any one of the preceding claims in which, apart from optional carriers or diluents, at least 2.5% by weight of fatty acid soap is present.
14. An agricultural composition as claimed in any one of the preceding claims in which the amount of fatty acid soap present is sufficient to produce at least monolayer of foam covering at least 60% of foliage surface area to which the composition is applied, according to a test as defined herein.

15. An agricultural composition as claimed in claim 14 in which the test is performed on any one or more of wild ginger, dock, dandelion, or scotch thistle.
16. An agricultural composition as claimed in any one of the preceding claims in which an optional carrier or diluent includes one or more of water, and water-miscible solvents.
17. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: surfactants, foaming agents, emulsifiers, pesticides, compatible fungicidal agents, fertilising components.
18. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: colourants, dyes, pigments.
19. A ready to use composition comprising an agricultural composition as claimed in any one of the preceding claims, diluted up to 1:9 with diluent comprising water.
20. The composition of claim 20 when used as a herbicide, by application to plant foliage.
21. The composition of any one of claims 1 through 19, diluted with water to a concentration below a thresh-hold in which there is significant herbicidal action, for use as a pesticide or fungicide.
22. A method of preparation of an agricultural composition which includes at least:
 - a) a monoterpene alcohol portion including a pine oil with an alcohol content of at least 60% by weight, and
 - b) a fatty acid soap from the combination of either or both of tall oil, or fatty acid compound, with an alkali metal compound,
 said method including the steps of:
 - i) combining the fatty acid compounds and/or tall oils with the monoterpene alcohol portion;
 - ii) dissolving an alkaline material in water;
 - iii) reacting the components of steps i) and ii).

23. The method of claim 2 when there is included, at step (i), other included optional components selected from: plant derived monoterpene alcohols, plant derived oils containing same, mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
24. The method of either claim 22 or claim 23 in which the pine oil has a total alcohol content of at least 80% by weight.
25. The method of any one of claims 22 through 24 in which, apart from water, there is present at least 55% by weight of pine oil in steps i) through iii).
26. The method of any one of claims 22 through 25 in which substantially all the fatty acid is introduced as a tall oil from pine.
27. The method of claim 26 in which, apart from water, there is from 12 through 25% inclusive, by weight, of tall oil introduced in step (i).
28. The method of claim 22 including the steps of:
 - i) combining a pine tall oil with a pine oil having a total alcohol content of at least 60%, the proportion of tall oil to pine oil being within the range of 10:80 through 25:60 inclusive;
 - ii) dissolving a metal hydroxide in water;
 - iii) combining the dissolved hydroxide with the components of step (i) and allowing to react until a soap is formed;
 - iv) optionally including any additional components.
29. A composition prepared according to the method of any one of claims 22 through 28.
30. The use of a composition as claimed in claim 29 as a herbicide.
31. The method of any one of claims 22 through 28 when used to prepare an agricultural composition as claimed in any one of claims 1 through 21.
32. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a selective foliar applied herbicide, said use comprising

dilution of the composition to within a range defined by observable thresholds with an upper limit being the concentration for significant or irreparable damage to desirable plants, and a lower limit being no significant damage to targetted plants.

33. The use of claim 32, in which the upper limit is defined by 10% or more of desirable plants being killed, and the lower limit by less than 10% or more of targetted plants being killed.
34. The use of claim 32 or claim 33 in which there are multiple applications of the composition.
35. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a pesticide or fungicide, said use comprising diluting the composition to below a level in which significant or irreparable damage is inflicted on desirable plants.
36. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a combined herbicide and either or both pesticide or fungicide, in which the composition is applied at a concentration sufficient to inflict significant or irreparable damage to targetted plants.
37. The use of claim 36 for preparing an in situ soil mulch from targetted plants.
38. The use of either claim 35 or claim 36 for pesticidal applications, in which the method of application maximises the production of foam or entrapped bubbles in the applied mixture.
39. The use of a composition as claimed in any one of claims 31 through 36 for pesticidal or herbicidal applications, in which the composition is applied in a manner in which at least a monolayer of bubbles are formed over at least 50% of the leaf foliage surface area to which the composition is applied.
40. The use of claim 39 in which the half-life of the formed bubbles, based on a 50% drop in the original covered surface area, is at least 2 minutes.
41. The use of claim 40 in which the half-life is at least 5 minutes.

42. The use of claim 40 in which the half-life is at least 10 minutes.
43. The use of claim 39 in which application is by spray through a foam inducing nozzle.
44. An agricultural composition, substantially as described herein with reference to the contained examples.
45. The use of an agricultural composition, substantially as described herein with reference to the contained examples, for herbicidal, pesticidal, and/or fungicidal applications.
46. A method for the manufacture of an agricultural composition, substantially as described herein with reference to the contained examples.

WHAT WE CLAIM IS

1. An agricultural composition including a combination of:
 - a) at least one monoterpene alcohol as defined herein, and
 - b) a fatty acid soapand optionally including one or more carriers or diluents.
2. An agricultural composition as claimed in claim 1, in which at least one monoterpene alcohol has been introduced as part of an oil derived from an evergreen tree.
3. An agricultural composition as claimed in claim 2 in which the oil is a pine oil.
4. An agricultural composition as claimed in any one of the preceding claims in which the fatty acid soap is derived from the reaction of a tall oil with an alkali.
5. An agricultural composition as claimed in any one of the preceding claims in which, excluding optional carriers and diluents, there is present at least 25% by weight of monoterpene alcohols as defined herein.
6. An agricultural composition as claimed in claim 3, or either of claims 4 or 5 when dependent upon claim 3, in which there is present, excluding optional carriers and diluents, at least 55% by weight of pine oil.
7. An agricultural composition as claimed in any one of claims 3, claim 6, or either of claims 4 or 5 when dependent upon claim 3, in which there is a minimum total alcohol content of 60% by weight in the pine oil.
8. An agricultural composition as claimed in claim 3, or any of claims 4 through 7 when dependent upon claim 3, in which in addition to the pine oil there is included either or both of additional monoterpene alcohols, or plant derived oils containing same.
9. An agricultural composition as claimed in claim 8 in which the additional monoterpene alcohols, or plant derived oils containing same, include: pinenes, terpineols, borneols, isoborneols, eucalyptus oil, citronellol, liminol, and oils from members of the citrus family.
10. An agricultural composition as claimed in claim 3, or any of claims 4 through 9 when dependent upon claim 3, in which in addition to the pine oil there is included at least one member from a group comprising: mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
11. An agricultural composition as claimed in claim 10 in which members of the listed group include: anethols, fenchols, members of the limonene family, members of the camphene family, members of the thujol family, dipentenenes, members of the eugenol family, members of the phellandrene family, and cavarcols.

12. An agricultural composition as claimed in claim 4 or in any of claims 5 through 11 when dependent upon claim 4, in which, excluding optional carriers or diluents, a maximum of 35% by weight of tall oil and fatty acid soaps derived therefrom are present.
13. An agricultural composition as claimed in claim 4 or in any of claims 5 through 11 when dependent upon claim 4, in which, excluding optional carriers or diluents, between 12 and 25% inclusive by weight of tall oil and fatty acid soaps derived therefrom are present.
14. An agricultural composition as claimed in any one of the preceding claims in which, apart from optional carriers or diluents, at least 2.5% by weight of fatty acid soap is present.
15. An agricultural composition as claimed in any one of claims 1 through 13 in which the amount of fatty acid soap present is sufficient to produce at least monolayer of foam covering at least 60% of foliage surface area to which the composition is applied, according to a test as defined herein.
16. An agricultural composition as claimed in claim 15 in which the test is performed on any one or more of wild ginger, dock, dandelion, or scotch thistle.
17. A herbicidal composition as claimed in any one of the preceding claims which includes one or more of water, and water-miscible solvents.
18. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: surfactants, foaming agents, emulsifiers, pesticides, compatible fungicidal agents, fertilising components.
19. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: colourants, dyes, pigments.
20. A ready to use composition comprising an agricultural composition as claimed in any one of claims 1 through 19, diluted up to 1:9 with diluent comprising water.
21. The composition of claim 20 when used as a herbicide, by application to plant foliage.
22. The composition of any one of claims 1 through 19, diluted with water to a concentration below a thresh-hold in which there is significant herbicidal action, for use as a pesticide or fungicide.
23. A method of preparation of an agricultural composition in which fatty acid soap is prepared from the reaction of fatty acid with an alkali material, and in which there is introduced into the composition at least monoterpene alcohol.
24. The method of claim 23 comprising the steps of:
 - i) combining the fatty acid and monoterpene alcohol portions;
 - ii) dissolving an alkaline material in water;
 - iii) reacting the components of steps i) and ii).

25. The method of claim 24 when other included optional components selected from: plant derived monoterpene alcohols, plant derived oils containing same, mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing; are included at step i).
26. The method of any one of claims 23 through 25 in which the monoterpene alcohol is introduced as pine oil.
27. The method of claim 26 in which the pine oil has a total alcohol content of at least 60% by weight.
28. The method of claim 26 or claim 27 in which, apart from water, there is present at least 55% by weight of pine oil in steps i) through iii).
29. The method of any one of claims 23 through 28 in which the fatty acid is introduced as a tall oil from pine.
30. The method of claim 29 in which, apart from water, there is from 12 through 25% inclusive, by weight, of tall oil in steps i) through iii).
31. The method of claim 29 in which, apart from water, there is a maximum of 35% by weight of tall oil present in steps i) through iii).
32. The method of claim 23 comprising the steps of:
 - i) combining a pine tall oil with a pine oil having a total alcohol content of at least 60%, the proportion of tall oil to pine oil being within the range of 10:80 through 25:60 inclusive;
 - ii) dissolving a metal hydroxide in water;
 - iii) combining the dissolved hydroxide with the components of step (i) and allowing to react until a soap is formed;
 - iv) optionally including any additional components.
33. A composition prepared according to the method of any one of claims 23 through 32.
34. The use of a composition as claimed in claim 33 as a herbicide.
35. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a selective foliar applied herbicide, said use comprising dilution of the composition to within a range defined by observable thresholds with an upper limit being the concentration for significant or irreparable damage to desirable plants, and a lower limit being no significant damage to targeted plants.
36. The use of claim 35, in which the upper limit is defined by 10% or more of desirable plants being killed, and the lower limit by less than 10% or more of targeted plants being killed.

37. The use of claim 35 or claim 36 in which there are multiple applications of the composition.
38. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a pesticide or fungicide, comprising diluting the composition to below a level in which significant or irreparable damage is inflicted on desirable plants.
39. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a combined herbicide and either or both pesticide or fungicide, in which the composition is applied at a concentration sufficient to inflict significant or irreparable damage to targeted plants.
40. The use of claim 39 for preparing an in situ soil mulch from targeted plants.
41. The use of either claim 38 or claim 39 for pesticidal applications, in which the method of application maximises the production of foam or entrapped bubbles in the applied mixture.
42. The use of a composition as claimed in any one of claims 34 through 39 for pesticidal or herbicidal applications, in which the composition is applied in a manner in which at least a monolayer of bubbles are formed over at least 50% of the leaf foliage surface area to which the composition is applied.
43. The use of claim 42 in which application is by spray in an air stream.
44. An agricultural composition, substantially as described herein with reference to the contained examples.
45. The use of an agricultural composition, substantially as described herein with reference to the contained examples, for herbicidal, pesticidal, and/or fungicidal applications.
46. A method for the manufacture of an agricultural composition, substantially as described herein with reference to the contained examples.



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<p>(54) Title: IMPROVEMENTS IN HERBICIDES</p> <p>(57) Abstract</p> <p>The present invention is directed to agricultural compositions which find primary use as a herbicide, though may also be used for pesticidal and fungicidal roles. The invention comprises compositions combining monoterpene compounds with fatty acid soaps. In particular monoterpene alcohols are preferred as a primary phytoactive agent. Preferred embodiments are based on coniferous oils, such as pine oil, in combination with a tall oil reacted with an alkali to form a fatty acid soap. Preferred methods of application include spraying in a manner in which some foaming effect is observed, which appears to confer advantage over the spray application of monoterpene compounds alone.</p>			

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IMPROVEMENTS IN HERBICIDES

TECHNICAL FIELD

The present invention is directed to compositions exhibiting herbicidal activity. Many compositions also exhibit insecticidal and/or fungicidal activity and thus this is also a consideration of the present invention. Preferred embodiments of the present invention combine monoterpene alcohols with fatty acid soaps.

BACKGROUND ART

Farming is one manifestation of civilisation and thus for some time man has attempted to clear areas of land for horticulture and agriculture as well as control what type of plants establish themselves there. In earlier times the methods used focused on physical effort or fire to remove and control weeds or unwanted growth. As time progressed it was recognised that various types of chemicals had an adverse effect on many plants and were an efficient alternative to labour intensive methods of control. With the rapid advance of the chemical and petro-chemical industries in the 19th and 20th centuries, chemical sprays for the control of not only plants but also fungus and insects etc. proliferated. Currently there is a wide range of insecticides and herbicides available which are based solely or predominantly on synthetic chemicals.

However, of more recent times there has been increased consumer backlash against the use of synthetic products, or products which are perceived not to be of natural origin. This consumer resistance is at least partially based on problems and difficulties associated with the use of chemicals in agriculture. The use of insecticides is one graphic example where for some time the problems of residue run-off entering the eco-system has caused problems down the food chain. As a consequence, much research has gone into the development of new synthetic insecticides which address this problem – typically by the use of products which bio-degrade quickly in the environment and/or are less likely to interfere or harm animals further up the food chain. Another solution has been to place more dependence upon the use of naturally occurring insecticides, many of which have been found to occur naturally in plants.

Herbicides represent a different area and have different problems. Here there are still problems with run-off and residues. Toxicity to animals and humans is also a major problem. For instance, the use of herbicides of the paraquat family have been tightly controlled or banned in many countries.

Residues represent a problem insofar as it is often desirable to sow over cleared ground as soon as possible after defoliation. Many herbicides have a residual period before re-sowing or over-sowing can occur. A further problem relates to residual compounds in the dead foliage. These may remain in the foliage until bio-degraded or otherwise eliminated into the environment. Having to physically remove dead foliage to allow immediate resowing is not a viable option in most instances.

The art has sought to address many of these problems. The glyphosate family of herbicide are very important commercially and are widely used where compounds of low toxicity and short residual life time in the soil are required. However, these compounds still represent synthetic products which are still resisted by the public's swing to naturally based products and organic farming.

While many insecticidal compounds occur naturally and have been identified (e.g. the pyrethrins) there is no such plant based herbicidal compounds in the art. This perhaps appears not to be surprising, for while many plants have evolved to produce compounds which repel or kill insects which may affect them, it is relatively uncommon, if at all observed, for plants to have to control other plants in a herbicidal manner. Accordingly, one cannot merely look directly to nature to provide an immediate solution to the aforementioned herbicidal problems.

The present invention seeks to address at least some of the problems associated with such prior art. In particular it seeks to provide compositions (and their use) for horticulture and agriculture which are based primarily on naturally occurring or derived substances and which are active in their preferred area of application without the need of compounds and substances which are generally regarded as being synthetic or non-organic. However, this is not to say that synthetically produced analogues of naturally occurring substances are not within the scope of the present invention, or that simple synthetic derivatives of the naturally occurring compounds are excluded either. It is also envisaged that chemical and industrial techniques may be used to extract or render the natural materials into a usable form.

It is recognised that a distinction in agriculture between organic and non-organic compounds is, in many instances, purely semantic. In many instances there is no chemical or biological difference between a naturally sourced or naturally occurring substance, and that substance when produced synthetically. In some instances the synthetic analogue may be cleaner, purer, and more cost effective. So, for the purposes of this specification, naturally occurring shall mean substances which occur naturally in nature, rather than the manner by which they were obtained or prepared.

Further, when reference is made to derivatives of these compounds, this shall generally mean derivatives which do not substantially differ in chemical structure or properties from the naturally occurring compound. By way of example this would generally mean one or two relatively simple substituted groups on the original compound, or compounds which have added on to or reacted with functional groups on the original compound. These substituted or added groups could also be of a relatively small size (e.g. up to C₅ or a simple functional group) rather than being of a size or character so as to dwarf or obscure the original naturally occurring compound. Some examples, which are meant to be illustrative only rather than limiting, include soluble salts of original compounds, and the substitution or addition of simple alkyl groups etc. The main exception to this description would be esters, in which case it is desirable that the added ester group is relatively small, or comprises another naturally occurring product.

Some of the problems outlined above have been recognised in the prior art and at least the specification of WO 97/16975 considers the use of certain plant derived products. In particular, pine oils, pine alcohols, pinene, dipentene and d-limonene are advocated. Their combination with tea tree and/or eucalyptus oils, is claimed to exhibit synergy. However, preferred embodiments of this specification require distillation of natural oils and extracts to leave substantially pure terpenes of interest. This can add substantially to the expense of the composition, which is a significant factor in agriculture.

For use, the active terpenes specified in WO 97/16975 may be diluted with a suitable carrier, and a

number of plant oils are listed. However, many of these oils are relatively expensive, and the application of non-volatile oils may in some circumstances be undesirable, depending upon the quantities distributed. However, in preferred embodiments of WO 97/16975 the substantially pure, distilled, compounds are applied undiluted to foliage.

- 5 The present applicant has found that direct application of the terpenes in the manner specified within WO 97/16975 may suffer from some disadvantage. For instance, the volatility of many of the components may cause them to flash-off from foliage before they are able to exhibit a herbicidal effect. This is particularly true in hot weather, and when foliage is exposed to direct sunlight. Accordingly the present invention also seeks to address this problem other than by merely
10 increasing the quantity of active compound applied. By way of example the present invention also considers enhancing the effectiveness of active components.

- The present invention also seeks to address the necessity for using highly purified, or distilled components such as advocated in WO 97/16975, or seeks at least to suggest alternatives thereto. Other aspects of the present invention may also address other perceived shortcomings with prior art
15 such as disclosed in WO 97/16975, such as rapidity of action.

It is therefore an object of the present invention to consider and attempt to address the foregoing problems and perceived limitations of the prior art, or at least to provide the public with a useful choice.

- Further aspects and advantages of the present invention will become apparent from the ensuing
20 description which is given by way of example only.

DISCLOSURE OF INVENTION

According to one aspect of the present invention there is provided an agricultural composition including a combination of:

- a) at least one monoterpene alcohol as defined herein, and
25 b) a fatty acid soap
and optionally including one or more carriers or diluents.

According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above in which the oil is a pine oil.

- According to another aspect of the present invention there is provided an agricultural composition as
30 claimed in any one of the preceding claims in which the fatty acid soap is derived from the reaction of a tall oil with an alkali.

According to another aspect of the present invention there is provided an agricultural composition as claimed in any one of the preceding claims in which, excluding optional carriers and diluents, there is present at least 30% by weight of monoterpene alcohols as defined herein.

- 35 According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above, in which there is present, excluding optional carriers and diluents, at least 55% by weight of pine oil.

According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above in which there is a minimum total alcohol of 60% by weight in the pine oil.

- 5 According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above, in which in addition to the pine oil there is included either or both of additional monoterpene alcohols, or plant derived oils containing same.

According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above in which, excluding optional carriers or diluents, a maximum of 35% by weight of tall oil and fatty acid soaps derived therefrom are present.

- 10 According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above in which, excluding optional carriers or diluents, between 12 and 25% inclusive by weight of tall oil and fatty acid soaps derived therefrom are present.

- 15 According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above in which, apart from optional carriers or diluents, at least 2.5% by weight of fatty acid soap is present.

According to another aspect of the present invention there is provided a herbicidal composition substantially as claimed above which includes one or more of water, and water-miscible solvents.

- 20 According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above which includes one or more of the following optional components: surfactants, foaming agents, emulsifiers, pesticides, compatible fungicidal agents, fertilising components.

According to another aspect of the present invention there is provided an agricultural composition substantially as claimed above which includes one or more of the following optional components: colourants, dyes, pigments.

- 25 According to another aspect of the present invention there is provided a composition, substantially as described above, which includes one or more of the following:
a terpineol, borneol, isoborneol, an anethol, a fenchol, a chavicol, a terpinene, limonene, citronellol, a pinene, camphene, camphor, a fenchone, a thujone, thymol, eucalyptol, dipentene, eugenol, phellandrene, ascaridole, cedrene, carvone, or anethole.

- 30 According to another aspect of the present invention there is provided a composition, substantially as described above, also exhibiting insect repellent abilities.

According to one aspect of the present invention there is provided a composition substantially as described above, diluted with water to a concentration below a thresh-hold in which there is significant herbicidal action, for use as a pesticide or fungicide.

- 35 According to another aspect of the present invention there is provided a composition, substantially as described above, characterised such that when the composition is sprayed onto foliage a foam

comprising a plurality of bubbles is created.

According to another aspect of the present invention there is provided a composition, substantially as described above, in which the foam comprises at least a monolayer of bubbles across the surface of the foliage.

- 5 According to another aspect of the present invention there is provided a composition, substantially as described above, in which the longevity of the foam is sufficient, under shaded, substantially wind and rain free conditions, is of a time during which the composition has caused visible and/or irreparable harm or damage to the plant.

- 10 According to a further aspect of the present invention there is provided a method of preparation of an agricultural composition in which fatty acid soap is prepared from the reaction of fatty acid with an alkali material, and in which there is introduced into the composition at least monoterpene alcohol.

According to a further aspect of the present invention there is provided a method substantially as described above comprising the steps of:

- 15 i) combining the fatty acid and monoterpene alcohol portions;
 ii) dissolving an alkaline material in water;
 iii) reacting the components of steps i) and ii).

According to a further aspect of the present invention there is provided a method substantially as described above in which the monoterpene alcohol is introduced as pine oil.

- 20 According to a further aspect of the present invention there is provided a method substantially as described above in which the fatty acid is introduced as a tall oil from pine.

According to a further aspect of the present invention there is provided a method substantially as described above comprising the steps of:

- 25 i) combining a pine tall oil with a pine oil having a total alcohol content of at least 60%, the proportion of tall oil to pine oil being within the range of 10:80 through 25:60 inclusive;
 ii) dissolving a metal hydroxide in water;
 iii) combining the dissolved hydroxide with the components of step (i) and allowing to react until a soap is formed;
30 iv) optionally including any additional components.

- According to a further aspect of the present invention there is provided the use of a composition substantially as described above as a selective foliar applied herbicide, said use comprising dilution of the composition to within a range defined by observable thresholds with an upper limit being the concentration for significant or irreparable damage to desirable plants, and a lower limit being no
35 significant damage to targeted plants.

According to a further aspect of the present invention there is provided the use substantially as described above in which the upper limit is defined by 10% or more of desirable plants being killed,

and the lower limit by less than 10% or more of targeted plants being killed.

According to a further aspect of the present invention there is provided the use of a composition substantially as described above in as a pesticide or fungicide, comprising diluting the composition to below a level in which significant or irreparable damage is inflicted on desirable plants.

- 5 According to a further aspect of the present invention there is provided the use of a composition substantially as described above, as a combined herbicide and either or both pesticide or fungicide, in which the composition is applied at a concentration sufficient to inflict significant or irreparable damage to targeted plants.

- 10 According to a further aspect of the present invention there is provided the application of a composition, substantially as described above, in a manner inducing to form a foam substantially coating a surface to which it is applied with a monolayer of bubbles, whose duration is such that after 5 minutes of shaded, wind free conditions at 20°C on a non-porous plant foliage surface at least 50% of the original foam covered surface still remains covered.

- 15 According to a further aspect of the present invention there is provided the use substantially as described above for pesticidal applications, in which the method of application maximises the production of foam or entrapped bubbles in the applied mixture.

- 20 According to a further aspect of the present invention there is provided the use of a composition substantially as described above, for pesticidal or herbicidal applications, in which the composition is applied in a manner in which at least a monolayer of bubbles are formed over at least 50% of the leaf foliage surface area to which the composition is applied.

According to a further aspect of the present invention there is provided the use substantially as described above in which application is by spray in an air stream.

- 25 According to a further aspect of the present invention there is provided the application of a composition, substantially as described above, a method for killing or severely damaging plants comprising the application of a phytoactive compound comprising at least one of a mono-cyclic monoterpene alcohol, bridged mono-cyclic monoterpene alcohol, or alcohol derivative of the foregoing; in combination with a fatty acid soap and under conditions in which the phytoactive compound is introduced to significant foliar surface area of the plant under conditions in which the phytoactive compound remains in contact with the plant's foliar and/or sub-foliar regions, for a
30 period of time sufficient to cause cell damage and/or interfere with plant function in those regions.

According to another aspect of the present invention there is provided a method, substantially as described above, in which the phytoactive components are protected from early evaporation and kept in contact with the plant through the use of a blanketing cover of foam.

- 35 A primary role of the present invention is to control and/or eradicate plant life. Many herbicidal, compositions according to the present invention may not be phytotoxic to all plants, and/or may only be phytotoxic after repeat applications or when applied in sufficient quantity. However for the purposes of simplicity, we shall use the term 'herbicidal' to include both the eradication as well as

control of at least some, if not all, known plants.

Secondary roles of the present invention include pest and insect related applications, as well as fungal related applications. By this is meant the use in the role of an insecticide as well as uses in repelling or limiting the effect of pests and insects on applied areas. This relates to the control of
5 pests either by limiting their number through eradication or repulsion, or making the targeted areas unattractive to the pests. The term 'pests' with the specification will generally refer to insects as well as arachnids.

A similar definition applies to fungicidal aspects of the present invention.

The present invention makes use of a number of compounds which occur naturally in a number of
10 plants. More specifically these comprise a number of monoterpenes, which will be described more fully later within this specification, and preferably monoterpene alcohols. The use of a number of these compounds have been documented in the prior art – for instance in WO 97/16975. However, as discussed previously, there are some disadvantages associated with the use of these compounds alone.

15 The present invention has sought to address this through the combination of such monoterpene compounds with fatty acid soaps. While it is not fully understood whether these soaps, or the vehicle in which they are presented (tall oils in preferred embodiments) there appears to be a useful advantage obtained through their inclusion. Whether observed enhanced effects over the use of straight monoterpenes is due to toxicity of the soaps, or their role in prolonging contact of
20 monoterpene actives with the plant (this role will be described more fully later herein), or as a result of both, is not known. However, there appears to be advantage obtained through the use of particular monoterpenes (and in particular the alcohols) in combination with fatty acid soaps (and particularly those derived from tall oils).

25 There are a number of potentially realisable advantages associated with the various embodiments of the present invention. Among the advantages which may be exhibited in the various embodiments include very rapid action on many plants, minimal residual phytotoxic effects, low toxicity to animals, and the fact that they are primarily based on naturally occurring compounds. This represents significant and useful advantages as well as offering the public further choice in the selection of horticultural and agricultural compositions.

30 As indicated above, the exact mechanism of how the present invention works is not fully understood. However it is considered that plant detrimental phytoactive effects caused through the use of the present invention include dehydration and irreversible plant cell damage. This is at least partially based on observations and trials of the present invention where observable damage occurs in leafy plants in and periods of less than one hour. This is in contrast to many of the hormonal
35 types of substances which may take several weeks to have a marked effect. It has therefore been concluded that such rapid observable manifestations of activity result from physical damage to the cell structure of the plants in at least the foliar and sub-foliar areas.

As the invention appears to cause plant damage in the leafy areas, this in turn has varying degrees of

effect on plant functions associated with these areas. This includes interference with photosynthesis, transpiration and respiration. Hence, while more delicate plants appear to succumb rapidly and irreversibly from the first observable effects of dehydration and/or cell damage, the more difficult plants continue a decline due to a severe reduction in their ability to function properly.

- 5 Typically the damage caused by application of the invention (over one or more applications) damages parts of the plant past the point from which the plant can recover.

In the prior art the invention of WO 97/16975 relies on the use of related compounds to the actives specified herein. However there appears to be a significant difference in the rapidity of action between the present invention (substantially faster) and the data outlined in the prior art
10 specification. While it is difficult to draw a direct comparison between two such groups of differently trialed data, it would appear to support that the added fatty acid soap either (or both) enhances the effect of the primary active components, or acts as an active component disrupting plant function.

The rapidity of activity also supports that embodiments of the invention do not act as a phytotoxin,
15 but rather damages the plant so it can no longer function and survive. This appears to be further supported by the negligible residual activity allowing rapid resowing and replanting of sprayed areas of land.

Preferred primary phytoactive compounds for use in the present invention comprise monoterpene alcohols, including in particular the alcohols of mono-cyclic monoterpenes, internally bridged
20 mono-cyclic monoterpenes, and mono-cyclic monoterpenes (including both bridged and unbridged) whose mono-cyclic ring is unsaturated, as well as derivatives of the foregoing.

For simplicity of description, the term 'mono-cyclic monoterpene' shall when used within this specification, unless otherwise specified, refer to both bridged and unbridged mono-cyclic monoterpenes – the bridge being an internal bridge across the ring, as well as mono-cyclic
25 monoterpenes whose mono-cyclic ring is unsaturated.

Less preferred primary phytoactives for use in the present invention include the aldehydes and ketones of mono-cyclic monoterpenes (as defined above). However the preference is for the use of monoterpene alcohols and when the aldehydes or ketones are used the preference is for the use as a secondary active component in addition to monoterpene alcohols as the primary active component.

- 30 Also of interest as phytoactive compounds in the present invention are derivatives of the foregoing – a discussion of what is regarded as being derivatives within the scope of the present invention has previously been given.

There are a number of compounds which fall within the above group of phytoactive compounds. As can be readily ascertained, these are based on monoterpene compounds which comprise a broad
35 group of compounds derived from the bio-synthesis of (typically two) C₅ (typically isopentene) units. The resulting monoterpene compounds are typically C₁₀ compounds and may be linear, bridged, or cyclic.

Examples of some preferred phytoactive compounds falling within the above grouping include the

borneol family of compounds (representative of bridged cyclic monoterpenes), the terpinene families (including the various terpinenes which are representative of monocyclic monoterpenes in which there is a degree of unsaturation in the monocyclic ring), terpineols (which are representative of monocyclic monoterpene alcohols). There are also a number of other phytoactive compounds
5 falling within the above definitions. These include, but are not restricted to, compounds in families including: the terpineols, the borneols, the isoborneols, the anethols, the fenchols, the limonene family, the pinene family, the camphene family, the thujol family, dipentene, the eugenol family of compounds, the phellandrene family, and the carvacrols. In the context of the group of (primary and secondary) phytoactive compounds, the above groups and families should generally be taken to
10 mean the alcohols, ketones, and aldehydes but may also include cyclic compounds bridged by an oxygen atom.

In practice, embodiments of the present invention may comprise only one of the group of phytoactive substances. However, as it is envisaged that most of these will be derived from natural sources, it is envisaged that there will commonly be present more than one of these phytoactive
15 components. This may be economically sensible as well, as purification of naturally derived products to exclude other components present is often both unnecessary and not cost effective. In addition – and it should be appreciated that the mechanisms of the invention are not fully understood – it is considered that while the actions of the various phytoactive compounds are equivalent in action they are not necessarily identical. There may be some variation in the activity of different
20 members of this group, and this will also depend upon a number of other factors including the species of plant to which it is applied, the conditions under which it is applied etc. Where a non-selective herbicide is desirable, there may be some advantage in including two or more of the phytoactive components in a composition.

Similarly, there may be some advantage in including a number of other naturally occurring
25 components in compositions according to the present invention. Envisaged are non-monoterpene compounds which are nevertheless very related to the monoterpenes and often occur naturally in some plants in conjunction with members of the phytoactive group. Examples of some of these additional components include the chavicol family, the citronellol family, and ascaridole family of compounds.

30 In a preferred embodiment of the present invention, the oil of an evergreen tree, rich in preferred phyto-active components, forms the basis for introducing the active compounds into the composition. Preferred evergreen trees are conifers, and for commercial reasons pine is preferred. The preference is to use oils which are rich in monoterpene alcohols (as defined herein) and preferably having a total alcohol content of at least 50%, more preferably 60%, and ideally at least
35 80% by weight.

By 'total alcohol content' is meant the percentage, by weight, of the material being considered which comprises compounds which are alcohols.

Preferred oils for introducing monoterpene compounds, according to the present invention, are pine oils. Pine oils vary in composition according to a number of factors. Preferred pine oils for use
40 with the present invention are those having a total alcohol content of at least 60%, and more

preferably at least 80%. It is also preferable that the majority of these alcohols comprise terpineol or pinene. A typical assay of a suitable pine oil is given in the examples.

5 The total alcohol content of the pine oil, or other components used for introducing monoterpene alcohols, will have a bearing on the required percentage of the oil (or component) in a concentrate formulation. Typically for a concentrate, to be diluted such as outlined in the ensuing examples, a minimum monoterpene alcohol content of at least 25% is desirable. More preferably 40%, and ideally at least 50% in the finished concentrate. This is assuming a concentrate possessing a maximum of 10% of diluents and carriers. Calculations may be performed to find equivalent desirable levels for compositions with other carrier/diluent levels.

10 The use of secondary active compounds have already been noted. It is envisaged that such secondary actives may be used to supplement monoterpene alcohol levels, though it is preferred that at least the minimum levels of monoterpene alcohols outlined above are present. However, a composition having only a 25% level of monoterpene alcohol will be more effective if there is, for instance, another 25% of monoterpene aldehyde or ketone also present as a secondary component
15 as opposed to carriers, diluents, or non-active components.

It is also noted that commercially available 'natural' pine oils are often rich in sulphur compounds as a consequence of the methods by which they are extracted. The raw products may be further refined to remove these sulphur compounds. Either form may be used in embodiments of the present invention. The choice will often be a compromise between cost, and the acceptability of one
20 form over the other in the market place.

Present in embodiments of the present invention are enhancing agents able to enhance the activity of the preferred active components. In the preferred embodiments of the applicant, these enhancers comprise fatty acid soaps. These components appear to enhance the activity of the primary active components (i.e. the monoterpene compounds) as well as enhancing the rapidity of their action.
25 Yet further, this also appear to extend the usefulness of compositions according to the present invention for pesticidal and anti-fungal roles.

Fatty acid soaps used generally comprise the salt of a fatty acid with a suitable cation – usually sodium or potassium. For economy, most fatty acid soaps in the present invention will have sodium as the cation, while the fatty acid will often be predominantly based on an alkyl in the C₁₄-
30 C₂₂ range.

The source of the fatty acid may vary. This may comprise compositions materials rich in fatty acids and which have been derived from natural materials. The preference is to use plant derived materials. Preferred embodiments of the present invention, and particularly those using pine oil, utilise tall oil as the fatty acid source. This is typically reacted with a suitably alkaline agent,
35 typically sodium hydroxide, to produce a soap.

As mentioned previously it is considered that the full nature of the role of the fatty acid is not understood. It is anticipated that part of the effectiveness of the present invention may result at least partially from the ability of the fatty acid soap to encourage a layer of bubbles or foam which inhibit

evaporation of the primary active components (the monoterpene compounds) from foliage. It is also considered that the fatty acid soaps may also be active in disrupting plant function, disrupting cellular or macro cellular processes in structures etc. The part hydrophilic and lipophilic nature of the soaps may also assist in enhancing the effectiveness of the primary active components, as well as interfering with the processes and structure of the plant.

It is also anticipated that other components in reagents such as tall oil may also be active in disrupting plant function. This may be one reason why the pine oil and tall oil based preferred embodiments of the present invention are especially effective.

The role of the carrier and diluents which are optionally used in conjunction with the present invention (they may not be present, or present only in limited amounts, in concentrates but are generally included in ready to use compositions) needs to be considered. The use of a suitable carrier or diluent, and in particular water, may extend beyond the mere use as a diluting agent for distribution of the other components. This will be described further below.

Hence, while it is envisaged that the above compounds will have an adverse effect upon plant material to which it is applied, application of the concentrated substances is generally economically impractical and expensive. For this reason it is generally desirable to include a suitable carrier for when the compositions are to be applied. While this could conceivably include suitable organic solvents, the difficulty in working with these carriers in an agricultural environment will generally preclude their use. Such difficulties include flammability and explosion dangers, as well as regulations governing the release of solvents into the environment. For this reason, preferred embodiments of the present invention will rely on water as the preferred carrier.

Another consideration involves the conditions upon which the spray is generally applied. In many environments volatile organic substances will flash off relatively quickly. If this happens too quickly, then the applied phytoactive components may be incapable of establishing the intimate contact with plant material required to result in plant damage. For this reason it is desirable to have a spraying composition which will promote or encourage intimate contact between the phytoactive components and the plants to which the composition is applied.

The use of water as a carrier goes some way towards solving this problem as water is not particularly volatile in comparison with many organic solvents and compounds. In addition the bulk of the water may have a slight cooling effect on the foliage so that any applied organic compounds are less likely to evaporate off. Further, water (though this is also true of some organic solvents) will readily migrate into the plant surface and may help carry with it any dispersed phytoactive components, particularly in combination with the presence of soaps, and optionally included additional components such as surfactants.

While such additional components may include surfactants and wetting agents, many wetting agents and surfactants are of synthetic origin and may not be permissible for organic farming methods. Consequently their use may preclude the present invention from being used in an area for which it was at least partially developed. Secondly, many surfactants and wetting agents alone (in lieu of the fatty acid soaps) will not necessarily provide another advantage of preferred embodiments of the

present invention. This further advantage comprises the ability, under ideal spraying conditions, to at least partially insulate the phytoactive components from the environment while they have a chance to work on the plant surface to which they are applied. Quite simply this can be achieved by the provision of a protective layer against rapid loss or evaporation of the phytoactive components and to also direct their action towards the plant. In practice this is found to be accomplished by the use of compositions which produce foam when sprayed onto the plant surface. In the present invention, the fatty acid soaps afford the foaming properties, though these may be enhanced by other commercially used and known foaming agents, or substances which increase the stability of foams or bubbles.

- 5
- 10 The insulating foam produced upon application need not be a substantial foam, but may merely comprise a monolayer of bubbles over the surface to which the composition is applied. This need not be the entire surface though ideally should cover at least 50% of the surface area, and more preferably at least 60%.

- The stability of the foam or bubble structure is another consideration. Ideally, such a foam would be long lived though in practice may have a half-life of the order of 3-5 minutes. In some instances shorter lived foams are also acceptable though a general preference would typically be foams whose duration is as follows:
- 15

- preferably, under shaded wind-free conditions at 20°C, applied to a broad-leafed plant surface which is not especially porous, at least 50% of the original surface area covered by foam or bubbles will still remain after 2 minutes;
- 20 - more preferably, under the above conditions, the same proportion of surface area should still remain covered by foam or bubbles after 5 minutes, and
- even more preferably, the same proportion of surface will be covered after 10 minutes.

A particular test which may be applied is given in the detailed examples hereafter.

- 25 It should be envisaged however that different conditions will have an influence upon what is acceptable in practice. Under higher ambient temperatures, the action of the phytoactive components may be quicker and absorption into the plant may also be quicker. Under these conditions foams which last a lesser period of time may be acceptable.

- Similarly it is envisaged that as the applied composition migrates into the plant structure, the ability to maintain a foam on the surface will also be lessened. In many instances, destruction of the foam or bubble structure is a result of the applied composition having the desired effects and entering into the plant. Under such conditions, it would no longer be necessary to maintain a protective foam layer as the components will have already performed a substantial proportion of their job. It is envisaged that many broad-leafed plants will fall into this category while other plants, and especially those having waxy surfaces slowing penetration of the phytoactive components, may require the foam/bubble covering to protect it from the environment for greater periods of time. These considerations should be borne in mind when preparing compositions of the present invention, and also in the preparation of their final spray compositions. However it is noted that tall oils are particularly effective in dissolving waxy substances and thus embodiments including tall oil fractions will exhibit increased effectiveness against plants having waxy leaves or foliar surfaces.
- 30
- 35
- 40

It is envisaged that there may be different embodiments destined for different types of application e.g. broad-leafed v. woody or difficult plants. Here the portion of components may vary to address any particular problems associated with that type of plant or grouping.

- 5 While foams may be produced by a number of different effects, it has been found in trials by the applicant that a useful foam structure may be achieved through the inclusion of fatty acid soaps with the phytoactive components. Common sources of fatty acids including those derived from plants (e.g. some tallol or tall oil formulations) represent a useful source of fatty acids for use in the present invention. These are usually reacted with a suitable alkaline material to form a soap for use in compositions of the present invention.
- 10 The use of fatty acids and their soaps appears to give a foam structure, particularly when combined with water as a diluent and applied with an air carrier, contributing to many of the advantages discussed before. However, it also appears that the use of these fatty acids and their soaps, as well as satisfying criteria for the use of organic compounds (insofar as the term organic is used in relation to agriculture), enhance the activity of the phytoactive components. As has been mentioned
- 15 previously, the exact mechanisms of the present invention are not fully understood though initial trials indicate that the combination of the phytoactive components with fatty acids and their soaps yields a highly effective herbicide with a very rapid effect (see also examples later herein).

- Accordingly, preferred embodiments of the present invention comprise a combination of the preferred phytoactive components with substances able to produce a covering foam, but most
- 20 preferably where the substances include or are based on fatty acids. At this stage there is no indication that any particular fatty acid is preferable to others though there may be some benefit in using fatty acids derived from plants, which represent one major commercial source of fatty acids, and particularly using tall oil.

- Various compositions may also include a number of additional optional components. These may
- 25 include active compounds which perform a particular role. These may merely rely on the compositions of the present invention as a carrier for their distribution, or may actively participate in how the present invention works. In the former category, these may include additional insecticides, fungicides, or other agricultural chemicals which act separately from the present invention. It is anticipated that their inclusion is primarily to avoid the user making two spray applications to plant
- 30 material, though it is also envisaged that there may be some additional advantages which result from the combined use.

- In the second class are components which participate in the working of the invention, or its usefulness. This may include surfactants and wetting agents as mentioned above. In addition this
- 35 may include additional foam enhancing agents. These may be agents which produce a foaming effect, or may alternatively prolong the life of any bubbles or foam produced in the present invention. A number of such agents are known commercially in these roles and may be employed in the present invention, providing the composition still conforms with user requirements (e.g. the presence or absence of non-organic materials).

Other components which may be optionally added include pigments and colourants. This may

simply for the role of enhancing the aesthetic appeal of the product (or for practical reasons such as to distinguish it from other substances. In addition it may serve a role as a marking for areas of foliage which have been sprayed, which would be particularly useful for aerial application of the present invention. Other optional components commonly used within the agricultural industry may also be considered for inclusion in the present invention.

Also included within the scope of the present invention are uses of the compositions. In most cases the main role of these compositions will be as a herbicide. This will typically be as a non-selective herbicide, and providing a suitable concentration is used, a useful non-selective herbicidal action against most plants can be achieved.

- 10 Methods of use may include repeat applications. This will tend to emphasise the effects of earlier sprays and may be used to address plant growth which missed the first spraying pass, or which survived that pass.

- 15 The present invention may also be used in a selective manner. Trials suggest that the present invention is most effective against broad leaf plants. Accordingly, there is application for the present invention as a selective broad leaf herbicide. Such uses will rely, as for most selective herbicides, upon the greater effect of the herbicide on some plants than others.

- 20 Compositions used for selective applications will usually be diluted to within a particular range of dilutions. While this will depend also upon the application rate, a typical dilution will be selected to fall within a range of threshold values falling below the point where desirable plants are affected adversely, but above the point where there is minimal harm to targeted plants. While user acceptability may differ, it is typically envisaged that the compositions will be applied in a manner such that no more than 10% of desirable plants are irreparably or significantly damaged and impaired. Similarly, there should be at least 10% mortality rate in targeted plants. In some instances either or both of these limits may be increased or decreased, depending upon acceptability.
- 25 However, it should also be considered that a lower degree of mortality may be acceptable for when the composition is being used in manner to slow the growth of targeted plants so as to provide desirable plants with a competitive advantage.

- Typical selective herbicidal uses of the present invention may include lawns, weed control between trees and saplings (e.g. in forestry, orchard, and plantation) as well as weed control between crops.
- 30 In some of these applications a greater degree of selectivity may be achieved by limiting application of the herbicidal composition to the vicinity of the targeted plants. This will minimise the impact of the composition on desirable plants, as well as reducing wastage of composition. Because the effectiveness of the present invention appears to be greatest when applied to foliage, it may find use for controlling weeds in between crops, as well as in forestry and plantations where compositions sprayed onto the basal area of trunks and stems of desirable plants may have a minimal effect compared with the control of the targeted weeds.
- 35

It has also been noted that the present invention can also exhibit pesticidal and fungicidal activity. Again in these applications a dilution and rate of application is generally chosen to avoid damage to desirable plants but to provide a useful level of pest and fungal control. In particular it has been

noted that the foaming nature of the present invention is particularly effective against sucking and chewing pests. As for plant foliage, the layer of bubbles/foam appears to trap the active components over the body of the pest until such time as it has exhibited a toxic effect. In addition, there may be suffocation of the pest which literally drowns in the foam.

- 5 Finally, it is envisaged that the present invention may be used in a combined role where it may act as a herbicide as well as either or both a fungicide or pesticide. In such instances, lesser dilutions may be used. Particular uses may include spraying between other desirable plants to control weeds. The anti-fungal properties can delay decomposition such that the affected plant material tends to dry first. Such material tends to more slowly break down and in the interim period tends to act as an effective mulch. This application may be particularly useful in drier areas.
- 10

BEST MODES FOR CARRYING OUT THE INVENTION

The following examples are given by way of example only. They are not meant to be limiting but merely demonstrative of some various ways by which the present invention may be implemented, prepared or formulated.

Example 1

15

- This example is directed less to a particular formulation according to the present invention but more to a method by which the effectiveness of various embodiments may be gauged. The following is a test which can be used to determine the duration of a foam structure. It may be used to determine preferred useful embodiments of the present invention, as well as representing one standard by which the foam structure of different embodiments may be compared.
- 20

- The test comprises the spray application of a spraying embodiment of the present invention. This spraying embodiment represents the diluted ready to use form of a composition according to the present invention. Accordingly, these tests may be used not only to assist in the preparation of different formulations of the present invention, but also to determine the preferred dilution ratios and carrier proportions.
- 25

- The spraying composition is sprayed at a pressure of 35psi air pressure through a solid cone 0.5mm orifice with a turbulator. The ideal surface is one representative of a broad-leafed plant. By way of example this may be a dandelion or hawk-bit leaf which is not under any particular stress. Other plants may include wild ginger, dock, or scotch thistle. Preferably an average obtained for a number of different plants would be obtained.
- 30

The test should be performed at an ambient temperature of 20°C and protected from both wind and direct sunlight. The leaf surface should be dry and dust free.

- After spray application, at least 60% of the surface area to which the composition was applied should be covered with at least a monolayer of bubbles. The time should be recorded for when a drop to 50% of this original area covered by foam/bubbles occurs – e.g. if the initial coverage was 70%, then time will be until coverage drops to 35%.
- 35

Least preferably, this period should be 2 minutes or greater. More preferably this period should be

5 minutes or greater. Ideally, this period would be 10 minutes or greater.

An alternative measure is when physical damage to the leaf becomes visible, though this can be relatively subjective.

Example 2

- 5 This example represents a typical scenario for the application of spraying compositions according to the present invention. This is particularly relevant to compositions such as described in example 5.

The composition, suitably diluted, was sprayed at a pressure of around 35psi through a solid cone 0.5mm orifice with a turbulator. The composition was applied on a sunny day at 25°C ambient temperature. There was no wind.

- 10 The composition was applied to a mixed foliage comprising typical pasture. In this example the pasture comprised both grasses and broad-leaves such as dandelion, which were dry of surface water and free of dust. The result was a light foam having bubbles of approximately 1-2mm diameter, which were white in colour and adhered to the foliage. The coverage was visible to the naked eye, which may be of advantage in many applications.

- 15 Under these conditions, preferred compositions of the invention will disappear after approximately 10 minutes of application leaving a visible discoloration of the foliage to a darker green. This darker green, which generally increases in darkness until browning off occurs (with visible dehydration) is indicative of stress and damage to the plant through the application of the composition.

20 Example 3

This example represents the typical time frames for significant and visible stress or damage to the plants according to use outlined in Example 2.

Table 1

	<u>Item</u>	<u>Time frame for significant visible damage or adverse effects</u>
25	Buttercup	1 hour
	Ragwort	2 hours
	Short grasses	1 hour
	Nightshade	1 hour
30	Dock	2 hours
	Dandelion	1 hour
	Scotch Thistle	24 hours
	Gorse	24 hours
	Wild Ginger	10 hours

- 35 This table should be used primarily for comparative purposes rather than as a source of empirical data. Actual time frames will vary according to the strength of the applied composition, the

saturation, the conditions under which the composition is applied, the health of the plant, the size and environmental conditions for the plant, etc.

It is noted also that some of the more virile species such as gorse will react first by dropping the head of each stalk, followed by a colour change to lighter green but all within the specified time frame above. However, it may be from between 3-7 days (on the above time scale) after spraying the gorse before it will have turned brown and be dry enough to burn off. Other species such as wild ginger will sag quickly and fall over as it subsequently dries out over the next two or three weeks.

The residues which may remain in the plant from embodiments of the present invention are generally harmless to subsequent plant growth. In some respects they may be likened to contact poisons when under certain preferred conditions. While some residue will remain in the decaying plant matter, the phytoactive components generally only adversely affect plants when they are able to have a localised effect on plants. During spray applications this localised effect is on the entire exposed surface of the plant.

Typically it has been observed that the foliage on the targeted weed is in the same condition as if it had been pulled from the ground and allowed to decompose. It has been found to be a useful mulch that can be left to decompose or cultivated back into the soil as many of the components of the present invention are naturally occurring products derived from plants, most plants will have no adverse effects from minor amounts of residue which may remain in the soil or mulched plant matter.

Example 4

The following represent some generalised examples of compositions according to the present invention. There are a large number of embodiments which may be formulated within the scope of the present invention as defined herein. The following represent just a few examples which are meant to be illustrative only.

Example 4a

This represents a concentrate which may be subsequently diluted with water before application;

<u>Percent by volume</u>	<u>Component</u>
50-95%	Pine Oil
0-45%	One or more oils from an evergreen tree preferably coniferous.
5-50%	Fatty acid of which at least 10% is present in the form of a soap of a fatty acid.
To a total of 100% by volume.	

Example 4b

This is another concentrate:

	<u>Percent by volume</u>	<u>Component</u>
5	30-90%	Oil from a coniferous evergreen tree including pine, cedar, fir;
	0-60%	Terpineol, methyl chavicol, borneol, isoborneol, pinene, cedrene, camphene, terpinene-1-ol, and/or terpinene-4-ol.
	0-30%	Oil of a non-coniferous evergreen tree such as Eucalyptus;
10	0-50%	One or more alcohols, aldehydes, or ketones of one or more of the following families or groups of compounds: anethol, chavicol, limonene, citronellol, camphene, camphor, fenchone, thujone, phellandrene, ascaridole, and carvone.
	3-50%	Fatty acids, preferably plant based and of which at least 10% is present in the form of a soap of the fatty acid, and wherein at least 3% by weight of the total undiluted composition comprises fatty acid soap.
15		
	To a total of 100% by volume.	

Example 4c

	<u>Per cent by volume</u>	<u>Component</u>
20	50-90%	Product # OI 100 manufactured by Akzo Nobel of Tauranga, New Zealand;
	10-50%	Fatty acid including one or more of palmitic acid, stearic acid, oleic acid, linoleic acid, pimaric acid, sandarocopinanic acid, palustric acid, levopimaric acid, abietic acid, dehydroabietic acid, and neoabietic acid, and wherein the fatty acid has been combined in with an alkaline metal (preferably sodium hydroxide) solution.
25		

To a total of 100% by volume.

A preferred concentration of alkali metal hydroxide is 25 - 50% w/v.

The list of fatty acids of this example may also be used as representative fatty acids for the other examples herein.

Example 5Example 5a

A preferred embodiment of the present invention comprises from 55 – 95% natural or refined pine oil. Preferably the pine oil has a total alcohol content of at least 60%. Pine oil from the USA has a typical total alcohol content of around 65%, while New Zealand Pine oil has a typical 85% content.

The US pine oil is effective in herbicidal compositions though the maximum dilution of such concentrates may be lessened if a useful result is to be achieved.

5 The preference is for the use of New Zealand pine oils having an 85% alcohol content. Trials and dilutions outlined in this specification have been based on the use of New Zealand pine oil. In particular the pine oils obtained from Eka Nobel and sold under the labels PINECHEM 530, PINECHEM 550, and PINECHEM 317 have been used.

The fatty acid/tall oil combination has been prepared by the reaction of a tall oil with sodium or potassium hydroxide. The tall oil should also be derived primarily from pine, and may be obtained from Eka Nobel, also of Tauranga, New Zealand.

10 A preferred ratio of tall oil to pine oil is within the range 10:80 through 25:60 inclusive. A specific formulation follows:

Example 5b

Within a tolerance of 2% the formulation comprises, by weight:

15	Tall oil/fatty acid combination:	20%
	Water:	10%
	Pine oil (80% or greater alcohol content):	70%.

This represents a concentrate which may be subsequently diluted for use. Typical dilution ranges are as per Example 6.

Example 5c

20 A method of preparation of the compositions of Examples 5a and 5b is as follows. The same method may also be applied to the compositions of other examples given herein.

The pine oil and tall oil components are combined and blended.

25 A solution of sodium hydroxide is prepared in the proportion of 25% NaOH to 75% H₂O. This solution is slowly added to the pine oils with tall oil combination. Typically 1 part of hydroxide solution is combined with 9 parts of pine/tall oil blend.

As per normal practice, the hydroxide solution is preferentially added to the greater volume of oils. Some heat will be produced through the dilution of the hydroxide solution which will promote the reaction to form soaps with fatty acids present in the tall oil.

30 Care should be taken to ensure adequate mixing during the addition of the hydroxide. Failure to do so may result in a substantially non-homogenous solution with lumps of soaps distributed in localised pockets throughout the resulting product. This is undesirable and may require additional blending to produce a substantially homogenous product (phase considerations aside) at the end of the process.

35 While additional components may be added prior to the addition of the hydroxide solution, they will be typically added after the main soap forming reaction.

The result is a concentrate which may be diluted before use. The preferred diluent is water to assist in foam formation. As a broad spectrum control system, the concentrate may be diluted 1:7 (by volume) with water. For woody and mature species a 1:5 dilution ratio may be used. Weaker spraying compositions based on a 1:9 dilution ratio may be used in some instances.

- 5 Reference has been made to some products available from the company Eka Nobel, from their Tauranga, New Zealand branch. A range of different products are available which may find use in the present invention, though specific grades and fractions of pine oils etc. have been identified which have been tested and found to be suitable for use in the present invention.

- 10 Each of these products are prepared to be substantially consistent in their composition. While it is anticipated that manufacturer's specifications are often subject to change, reference can be made to manufacturer's data sheets detailing specifications of products available in 1998/1999.

For the assistance of the reader, primary components in the preferred pine oils specified above comprise:

- | | | |
|----|-------------------------|---------------------|
| | alpha terpineol: | around 50% |
| 15 | Beta terpineol: | around 13 – 15% |
| | Borneol: | around 8 – 9% |
| | Terpinene-4-ol: | around 5% |
| | Other terpene alcohols: | around 5 – 8% |
| | Other components: | to a total of 100%. |

- 20 By way of example, a tall oil rich in fatty acids is the product PINECHEM 317. A typical composition of a product of this type is:

- | | | |
|----|---------------------------------------|---------------------|
| | Oleic acid: | around 25 – 30% |
| | Linoleic acid: | around 20% |
| | Stearic and palmitic acids: | around 1 – 2% |
| 25 | Pimaric acid: | around 9 – 10%. |
| | Fatty acids of those specified above: | 25 – 30%. |
| | Various other acids and components | to a total of 100%. |

- 30 The above lists are intended to be illustrative only. Oils (including oils other than those based on pine) and fatty acid sources with significant differently compositions are also envisaged to fall within the scope of the present invention. However, these particular component distributions exist in compositions which the applicant has found to be particularly useful.

Example 6

- 35 The embodiments of the present invention may also be put to other uses. This includes use as a germicide, or bactericide (many of the phytoactive components also have germicidal and/or bactericidal effects). While this may be a primary role of the compositions, it is envisaged that it will be a supplementary or secondary advantage of the present invention.

It may also find a role as a fungicide or in the control of fungi.

Finally, it also has some insecticidal capabilities and/or may act as a repellent. Some of the phytoactive components and/or other preferred added components, are unattractive to insects and can act as either an insecticide or more commonly as a repellent to insect infestation.

Some preliminary tests using embodiments of the present invention (as per Example 2 and at the dilutions thereof) had a noticeable effect on insects within the following time frames:

Table 2

<u>Insect</u>	<u>Time frame for significant visible damage or adverse effects</u>
Aphids	Less than 1 minute
10 Black Beetles	2 minutes
Crickets	2 minutes
Green Shield bug	2 minutes
Ants	2 minutes
Wasps/Hornets	4 minutes.

15 Example 7

The following characteristics are given in relation to the use of compositions such as given in Examples 2 and 5:

- 20 - in the case of plant species which grow from a strong root structure, re-application to re-growth may be required. This will eventually stress the plant permanently resulting in its eradication;
- creeping varieties such as Kikuyu and Couch will be controlled when sprayed however if the stem is thick a timed re-application will be necessary;
- 25 - heavily rooted plants such as Paspallum with thick seed stems appear to need timed re-application even though their leaf foliage dehydrates almost straight away. However after re-application they will be permanently stressed and eradicated;
- the above examples are also subject to the season. Any grow back after initial application is reduced during the plant's growing season while in the dormant season re-treatment may be unnecessary due to the reduced activity of the plant during that period;
- 30 - eradication of pests in the pasture and foliage is evident and appears effective across a wide range of species. When treating weeds it is inevitable that pests will also be sprayed. These appear to die or quickly move from the affected areas and may then die;
- colour changes and wilting will occur sometimes within an hour;
- 35 - most compositions are bio-degradable and/or evaporate their main components. For the concentrate, a typical expected breakdown period of around 60% bio-degradation or other removal within 28 days. However, use of the invention involves a diluted form. Preliminary trails suggest that for a 1:5 dilution (relatively strong spraying composition) the

biodegradation/elimination period is much less and in favourable circumstances may even be measured in hours.

- it appears that the phytoactive components do not leach into surrounding plants or the soil in any appreciable or significant amount;
- 5 - the pleasant odour associated with many of the phytoactive components is a characteristic after spraying;
- the preferred composition are generally non-toxic or of very low toxicity to humans and other warm blooded animals;
- the included fatty acid soaps afford good penetration and wetting action in most applications;
- 10 - the foam cover in preferred embodiments enhances action of the active components;
- preferred embodiments leave a visible indication of where they have been applied;
- at least some herbicidal, insecticidal, germicidal, and fungicidal activity may all be obtained using the one composition.

Example 8

- 15 The present invention may also be used in the role of a selective herbicide. This use will depend primarily on the method of use of the invention rather than solely on the composition. However, it is anticipated that different embodiments of the present invention will have different effects on different plants. Accordingly, particular embodiments which exhibit greater or lesser effects against particular plants will preferentially be used in selective type applications.
- 20 It is impractical to provide data for all available plants and often environmental factors will also affect the exact results obtained. While a certain degree of latitude exists for herbicidal applications (for instance it does not matter whether the exact amount, or twice as much, herbicide is used) there is a lesser degree of latitude for selective type operations. Accordingly it is envisaged that prior to use the user will perform some brief tests to optimise the dilutions and application rate appropriate
- 25 for their particular use.

Example 8a

As a guide, a small area of selected plants representing both targeted and desirable plants is chosen. These should ideally be selected in an environment which closely matches the environment to which the herbicide is intended to be applied in a selective manner.

- 30 A range of dilutions of herbicide are prepared, and typically the strongest of these will be at a dilution less than that typically used for general non-selective herbicidal application. By way of example the strongest solution will typically be 1:11 with water.

The differing concentration are applied and the observed results evaluated for the best ratio between target weed control, and minimum desired plant damage.

Example 8b

5 A specific example for broad leaf control and lawn may be as follows. An area of lawn is divided into squares of perhaps 0.5 metres x 0.5 metres. The lawn should be relatively uniform in terms of both the distribution of targeted weeds and the species of grass which has been sown. If necessary the size of each test area may be varied to ensure a more representative sample area.

A range of different dilutions are applied, one to each sample square. As the effects are generally quite rapid, the sample plots can be evaluated after two hours, though ideally, the sample plot should be re-checked after a greater period of time e.g. 1 – 3 days, to determine whether there are any longer term effects.

10 The dilution chosen will be one which represents a reasonable compromise between control of broad leaf weeds but minimal damage to the grass.

It is also noted that different species of grass, and weeds, may vary significantly in their sensitivity to the present invention. Accordingly the present invention may not be able to be used in such a selective type manner in all instances.

15 Example 9

While herbicidal embodiments of the present invention will also tend to exhibit some pesticidal and fungicidal control, there are instances where pesticidal and fungicidal effects are desired over herbicidal effects. This may include the control of insects, pests, and fungi on desirable plants.

20 Again, because there is only a small degree of latitude in such applications of the invention, and because the sensitivity of different plants varies so much, it is desirable that a series of tests similar to that of the preceding example are performed. However, in this case the evaluation of the trial results will be to determine the maximum possible concentration of composition which may be applied without significant damage to the plant(s).

25 Insect control can be enhanced in many instances by increasing the foaming effect – not only in terms of the amount of foam produced, but also the longevity of the foam. Accordingly, the addition of commercial known and used foaming agents, and bubble stabilising components, may also be considered. Manufacturer's data sheets, and some minimal trial and experimentation by the user will be able to determine which such commercially available components are most effective for the intended application. Again if it is intended that the composition is to be used according to organic farming methods, then some consideration may need to be given as to the acceptability of
30 any added components.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof as defined in the appended claims.

WHAT WE CLAIM IS

1. An agricultural composition including a combination of:
 - a) at least one monoterpene alcohol as defined herein, and
 - b) a fatty acid soapand optionally including one or more carriers or diluents.
2. An agricultural composition as claimed in claim 1, in which at least one monoterpene alcohol has been introduced as part of an oil derived from an evergreen tree.
3. An agricultural composition as claimed in claim 2 in which the oil is a pine oil.
4. An agricultural composition as claimed in any one of the preceding claims in which the fatty acid soap is derived from the reaction of a tall oil with an alkali.
5. An agricultural composition as claimed in any one of the preceding claims in which, excluding optional carriers and diluents, there is present at least 25% by weight of monoterpene alcohols as defined herein.
6. An agricultural composition as claimed in claim 3, or either of claims 4 or 5 when dependent upon claim 3, in which there is present, excluding optional carriers and diluents, at least 55% by weight of pine oil.
7. An agricultural composition as claimed in any one of claims 3, claim 6, or either of claims 4 or 5 when dependent upon claim 3, in which there is a minimum total alcohol content of 60% by weight in the pine oil.
8. An agricultural composition as claimed in claim 3, or any of claims 4 through 7 when dependent upon claim 3, in which in addition to the pine oil there is included either or both of additional monoterpene alcohols, or plant derived oils containing same.
9. An agricultural composition as claimed in claim 8 in which the additional monoterpene alcohols, or plant derived oils containing same, include: pinenes, terpineols, borneols, isoborneols, eucalyptus oil, citronellol, liminol, and oils from members of the citrus family.
10. An agricultural composition as claimed in claim 3, or any of claims 4 through 9 when dependent upon claim 3, in which in addition to the pine oil there is included at least one member from a group comprising: mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
11. An agricultural composition as claimed in claim 10 in which members of the listed group include: anethols, fenchols, members of the limonene family, members of the camphene family, members of the thujol family, dipentenenes, members of the eugenol family, members of the phellandrene family, and cavarcols.

12. An agricultural composition as claimed in claim 4 or in any of claims 5 through 11 when dependent upon claim 4, in which, excluding optional carriers or diluents, a maximum of 35% by weight of tall oil and fatty acid soaps derived therefrom are present.
13. An agricultural composition as claimed in claim 4 or in any of claims 5 through 11 when dependent upon claim 4, in which, excluding optional carriers or diluents, between 12 and 25% inclusive by weight of tall oil and fatty acid soaps derived therefrom are present.
14. An agricultural composition as claimed in any one of the preceding claims in which, apart from optional carriers or diluents, at least 2.5% by weight of fatty acid soap is present.
15. An agricultural composition as claimed in any one of claims 1 through 13 in which the amount of fatty acid soap present is sufficient to produce at least monolayer of foam covering at least 60% of foliage surface area to which the composition is applied, according to a test as defined herein.
16. An agricultural composition as claimed in claim 15 in which the test is performed on any one or more of wild ginger, dock, dandelion, or scotch thistle.
17. A herbicidal composition as claimed in any one of the preceding claims which includes one or more of water, and water-miscible solvents.
18. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: surfactants, foaming agents, emulsifiers, pesticides, compatible fungicidal agents, fertilising components.
19. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: colourants, dyes, pigments.
20. A ready to use composition comprising an agricultural composition as claimed in any one of claims 1 through 19, diluted up to 1:9 with diluent comprising water.
21. The composition of claim 20 when used as a herbicide, by application to plant foliage.
22. The composition of any one of claims 1 through 19, diluted with water to a concentration below a thresh-hold in which there is significant herbicidal action, for use as a pesticide or fungicide.
23. A method of preparation of an agricultural composition in which fatty acid soap is prepared from the reaction of fatty acid with an alkali material, and in which there is introduced into the composition at least monoterpene alcohol.
24. The method of claim 23 comprising the steps of:
 - i) combining the fatty acid and monoterpene alcohol portions;
 - ii) dissolving an alkaline material in water;
 - iii) reacting the components of steps i) and ii).

25. The method of claim 24 when other included optional components selected from: plant derived monoterpene alcohols, plant derived oils containing same, mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing; are included at step i).
26. The method of any one of claims 23 through 25 in which the monoterpene alcohol is introduced as pine oil.
27. The method of claim 26 in which the pine oil has a total alcohol content of at least 60% by weight.
28. The method of claim 26 or claim 27 in which, apart from water, there is present at least 55% by weight of pine oil in steps i) through iii).
29. The method of any one of claims 23 through 28 in which the fatty acid is introduced as a tall oil from pine.
30. The method of claim 29 in which, apart from water, there is from 12 through 25% inclusive, by weight, of tall oil in steps i) through iii).
31. The method of claim 29 in which, apart from water, there is a maximum of 35% by weight of tall oil present in steps i) through iii).
32. The method of claim 23 comprising the steps of:
 - i) combining a pine tall oil with a pine oil having a total alcohol content of at least 60%, the proportion of tall oil to pine oil being within the range of 10:80 through 25:60 inclusive;
 - ii) dissolving a metal hydroxide in water;
 - iii) combining the dissolved hydroxide with the components of step (i) and allowing to react until a soap is formed;
 - iv) optionally including any additional components.
33. A composition prepared according to the method of any one of claims 23 through 32.
34. The use of a composition as claimed in claim 33 as a herbicide.
35. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a selective foliar applied herbicide, said use comprising dilution of the composition to within a range defined by observable thresholds with an upper limit being the concentration for significant or irreparable damage to desirable plants, and a lower limit being no significant damage to targeted plants.
36. The use of claim 35, in which the upper limit is defined by 10% or more of desirable plants being killed, and the lower limit by less than 10% or more of targeted plants being killed.

37. The use of claim 35 or claim 36 in which there are multiple applications of the composition.
38. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a pesticide or fungicide, comprising diluting the composition to below a level in which significant or irreparable damage is inflicted on desirable plants.
39. The use of a composition as claimed in any one of claims 1 through 20, or claim 33, as a combined herbicide and either or both pesticide or fungicide, in which the composition is applied at a concentration sufficient to inflict significant or irreparable damage to targeted plants.
40. The use of claim 39 for preparing an in situ soil mulch from targeted plants.
41. The use of either claim 38 or claim 39 for pesticidal applications, in which the method of application maximises the production of foam or entrapped bubbles in the applied mixture.
42. The use of a composition as claimed in any one of claims 34 through 39 for pesticidal or herbicidal applications, in which the composition is applied in a manner in which at least a monolayer of bubbles are formed over at least 50% of the leaf foliage surface area to which the composition is applied.
43. The use of claim 42 in which application is by spray in an air stream.
44. An agricultural composition, substantially as described herein with reference to the contained examples.
45. The use of an agricultural composition, substantially as described herein with reference to the contained examples, for herbicidal, pesticidal, and/or fungicidal applications.
46. A method for the manufacture of an agricultural composition, substantially as described herein with reference to the contained examples.



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(21) International Application Number: PCT/NZ99/00047 (22) International Filing Date: 21 April 1999 (21.04.99) (30) Priority Data: 330283 21 April 1998 (21.04.98) NZ (71) Applicant (for all designated States except US): ORGANIC INTERCEPTOR PRODUCTS LIMITED [NZ/NZ]; 10 College Hill, Ponsonby 1001 (NZ). (72) Inventor; and (75) Inventor/Applicant (for US only): INNES, Rodney, Mitchell [NZ/NZ]; 'Innes Heights', 25 State Highway, Te Kouma 2851 (NZ). (74) Agent: SIMS, Anthony, W.; 29 Clarence Street, Private Bag 3140, Hamilton 2001 (NZ).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 9 December 1999 (09.12.99)
(54) Title: IMPROVEMENTS IN HERBICIDES		
(57) Abstract <p>The present invention is directed to agricultural compositions which find primary use as a herbicide, though may also be used for pesticidal and fungicidal roles. The invention comprises compositions combining monoterpene compounds with fatty acid soaps. In particular monoterpene alcohols are preferred as a primary phytoactive agent. Preferred embodiments are based on coniferous oils, such as pine oil, in combination with a tall oil reacted with an alkali to form a fatty acid soap. Preferred methods of application include spraying in a manner in which some foaming effect is observed, which appears to confer advantage over the spray application of monoterpene compounds alone.</p>		

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A01N

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 9105472 A1 (SAFER, INC.), 2 May 1991 (02.05.91), page 1, line 25 - page 2, line 5; page 3, line 29 - line 31; page 4, line 2 - line 3; page 9, line 20 - line 26 --	1-46
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International application No.

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(21) International Application Number: PCT/NZ99/00047 (22) International Filing Date: 21 April 1999 (21.04.99) (30) Priority Data: 330283 21 April 1998 (21.04.98) NZ (71) Applicant (for all designated States except US): ORGANIC INTERCEPTOR PRODUCTS LIMITED [NZ/NZ]; 10 College Hill, Ponsonby 1001 (NZ). (72) Inventor; and (75) Inventor/Applicant (for US only): INNES, Rodney, Mitchell [NZ/NZ]; 'Innes Heights', 25 State Highway, Te Kouma 2851 (NZ). (74) Agent: SIMS, Anthony, W.; 29 Clarence Street, Private Bag 3140, Hamilton 2001 (NZ).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>With amended claims.</i> (88) Date of publication of the international search report: 9 December 1999 (09.12.99) Date of publication of the amended claims: 6 January 2000 (06.01.00)
(54) Title: IMPROVEMENTS IN HERBICIDES (57) Abstract The present invention is directed to agricultural compositions which find primary use as a herbicide, though may also be used for pesticidal and fungicidal roles. The invention comprises compositions combining monoterpene compounds with fatty acid soaps. In particular monoterpene alcohols are preferred as a primary phytoactive agent. Preferred embodiments are based on coniferous oils, such as pine oil, in combination with a tall oil reacted with an alkali to form a fatty acid soap. Preferred methods of application include spraying in a manner in which some foaming effect is observed, which appears to confer advantage over the spray application of monoterpene compounds alone.		

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AMENDED CLAIMS

[received by the International Bureau on 17 November 1999 (17.11.99);
original claims 1-46 replaced by amended claims 1-46 (6 pages)]

1. An agricultural composition including a combination of:
 - a) a monoterpene alcohol portion including a pine oil with an alcohol content of at least 60% by weight,
 - b) a fatty acid soap from the combination of either or both of tall oil, or fatty acid compound, with an alkali metal compound,
 - c) optionally including a foam enhancing agent as defined herein, and
 - d) optionally including one or more carriers or diluents;the proportion of (b) fatty acid soap and (c) foam enhancing agent, in the composition, being sufficient to allow the composition to be applied as, or to produce, a foam having at least a surface monolayer of bubbles during use.
2. An agricultural composition as claimed in claim 1 in which the monoterpene alcohol portion includes pine oil having an alcohol content of at least 80%.
3. An agricultural composition as claimed in claim 2 in which substantially all of the monoterpene alcohol portion comprises pine oil.
4. An agricultural composition as claimed in any one of the preceding claims in which the fatty acid soap is derived substantially entirely from tall oil, and in which the ratio of tall oil to pine oil used in preparing the composition is within the range of 10:80 to 25:60 by weight.
5. An agricultural composition as claimed in any one of the preceding claims in which, excluding optional carriers and diluents, there is present at least 30% by weight of monoterpene alcohols as defined herein.
6. An agricultural composition as claimed in any one of the preceding claims in which there is present, excluding optional components, at least 55% by weight of pine oil.
7. An agricultural composition as claimed in any one of the preceding claims, in which in addition to the pine oil the monoterpene alcohol

portion includes either or both of additional monoterpene alcohols, or plant derived oils containing same.

8. An agricultural composition as claimed in claim 7 in which the additional monoterpene alcohols, or plant derived oils containing same, include: pinenes, terpineols, borneols, isoborneols, eucalyptus oil, citronellol, liminol, and oils from members of the citrus family.
9. An agricultural composition as claimed in any one of the preceding claims, which also includes at least one member from a group comprising: mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
10. An agricultural composition as claimed in claim 9 in which members of the listed group include: anethols, fenchols, members of the limonene family, members of the camphene family, members of the thujol family, dipentes, members of the eugenol family, members of the phellandrene family, and cavarcols.
11. An agricultural composition as claimed in any one of the preceding claims, in which, excluding optional components, a maximum of 35% by weight of tall oil and fatty acid soaps are present.
12. An agricultural composition as claimed in claim 11 in which, excluding optional carriers or diluents, between 12 and 25% inclusive by weight of tall oil and fatty acid soaps derived therefrom are present.
13. An agricultural composition as claimed in any one of the preceding claims in which, apart from optional carriers or diluents, at least 2.5% by weight of fatty acid soap is present.
14. An agricultural composition as claimed in any one of the preceding claims in which the amount of fatty acid soap present is sufficient to produce at least monolayer of foam covering at least 60% of foliage surface area to which the composition is applied, according to a test as defined herein.

15. An agricultural composition as claimed in claim 14 in which the test is performed on any one or more of wild ginger, dock, dandelion, or scotch thistle.
16. An agricultural composition as claimed in any one of the preceding claims in which an optional carrier or diluent includes one or more of water, and water-miscible solvents.
17. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: surfactants, foaming agents, emulsifiers, pesticides, compatible fungicidal agents, fertilising components.
18. An agricultural composition as claimed in any one of the preceding claims which includes one or more of the following optional components: colourants, dyes, pigments.
19. A ready to use composition comprising an agricultural composition as claimed in any one of the preceding claims, diluted up to 1:9 with diluent comprising water.
20. The composition of claim 20 when used as a herbicide, by application to plant foliage.
21. The composition of any one of claims 1 through 19, diluted with water to a concentration below a thresh-hold in which there is significant herbicidal action, for use as a pesticide or fungicide.
22. A method of preparation of an agricultural composition which includes at least:
 - a) a monoterpene alcohol portion including a pine oil with an alcohol content of at least 60% by weight, and
 - b) a fatty acid soap from the combination of either or both of tall oil, or fatty acid compound, with an alkali metal compound,said method including the steps of:
 - i) combining the fatty acid compounds and/or tall oils with the monoterpene alcohol portion;
 - ii) dissolving an alkaline material in water;
 - iii) reacting the components of steps i) and ii).

23. The method of claim 2 when there is included, at step (i), other included optional components selected from: plant derived monoterpene alcohols, plant derived oils containing same, mono-cyclic monoterpene aldehydes, mono-cyclic monoterpene ketones, bridged mono-cyclic monoterpene aldehydes, bridged mono-cyclic monoterpene ketones, internally bridged monocyclic monoterpenes, unbridged monocyclic monoterpenes, and simple substituted derivatives of the foregoing.
24. The method of either claim 22 or claim 23 in which the pine oil has a total alcohol content of at least 80% by weight.
25. The method of any one of claims 22 through 24 in which, apart from water, there is present at least 55% by weight of pine oil in steps i) through iii).
26. The method of any one of claims 22 through 25 in which substantially all the fatty acid is introduced as a tall oil from pine.
27. The method of claim 26 in which, apart from water, there is from 12 through 25% inclusive, by weight, of tall oil introduced in step (i).
28. The method of claim 22 including the steps of:
 - i) combining a pine tall oil with a pine oil having a total alcohol content of at least 60%, the proportion of tall oil to pine oil being within the range of 10:80 through 25:60 inclusive;
 - ii) dissolving a metal hydroxide in water;
 - iii) combining the dissolved hydroxide with the components of step (i) and allowing to react until a soap is formed;
 - iv) optionally including any additional components.
29. A composition prepared according to the method of any one of claims 22 through 28.
30. The use of a composition as claimed in claim 29 as a herbicide.
31. The method of any one of claims 22 through 28 when used to prepare an agricultural composition as claimed in any one of claims 1 through 21.
32. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a selective foliar applied herbicide, said use comprising

dilution of the composition to within a range defined by observable thresholds with an upper limit being the concentration for significant or irreparable damage to desirable plants, and a lower limit being no significant damage to targetted plants.

33. The use of claim 32, in which the upper limit is defined by 10% or more of desirable plants being killed, and the lower limit by less than 10% or more of targetted plants being killed.
34. The use of claim 32 or claim 33 in which there are multiple applications of the composition.
35. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a pesticide or fungicide, said use comprising diluting the composition to below a level in which significant or irreparable damage is inflicted on desirable plants.
36. The use of a composition as claimed in any one of claims 1 through 21, or claim 29, as a combined herbicide and either or both pesticide or fungicide, in which the composition is applied at a concentration sufficient to inflict significant or irreparable damage to targetted plants.
37. The use of claim 36 for preparing an in situ soil mulch from targetted plants.
38. The use of either claim 35 or claim 36 for pesticidal applications, in which the method of application maximises the production of foam or entrapped bubbles in the applied mixture.
39. The use of a composition as claimed in any one of claims 31 through 36 for pesticidal or herbicidal applications, in which the composition is applied in a manner in which at least a monolayer of bubbles are formed over at least 50% of the leaf foliage surface area to which the composition is applied.
40. The use of claim 39 in which the half-life of the formed bubbles, based on a 50% drop in the original covered surface area, is at least 2 minutes.
41. The use of claim 40 in which the half-life is at least 5 minutes.

42. The use of claim 40 in which the half-life is at least 10 minutes.
43. The use of claim 39 in which application is by spray through a foam inducing nozzle.
44. An agricultural composition, substantially as described herein with reference to the contained examples.
45. The use of an agricultural composition, substantially as described herein with reference to the contained examples, for herbicidal, pesticidal, and/or fungicidal applications.
46. A method for the manufacture of an agricultural composition, substantially as described herein with reference to the contained examples.